



OPEN
Compute Project



Regional
Community

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Compute Project



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CLOUD INNOVATIONS

- ▶ **Murugasamy (Sammy) Nachimuthu**
- ▶ **Sr. Principal Engineer, Intel Corporation**



Agenda

- ▶ Cloud and OCP
- ▶ Intel® Platforms and Solution Innovations
- ▶ System Firmware Improvements
- ▶ Summary and Call to Action



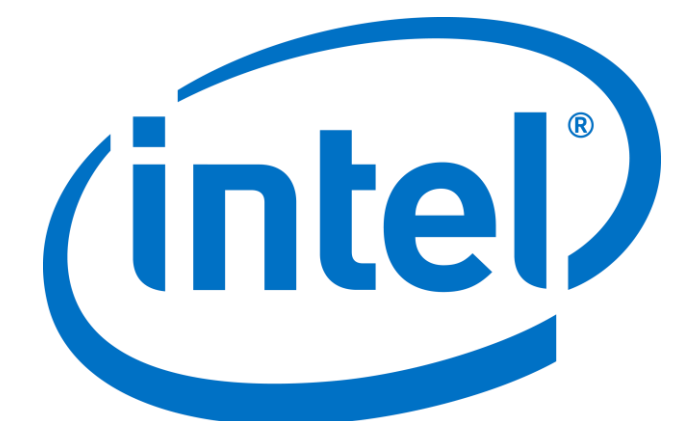
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Cloud and OCP



Public Cloud Growth Continues – Driving Greater Infrastructure demands

BY 2021



Digital Retail
\$4.9T¹



Digital Advertising
\$400B²



Digital Video & Media
\$120B³



Cloud Services
\$300B⁴

1. Digital Retail – eMarketer Jan/March 2018
2. Digital Ads – eMarketer May 2018
3. Digital video/media – Juniper Research, Subscription Video on Demand, Dec 2017
4. XaaS (cloud services) – IDC Public Cloud Services Tracker Forecast 2017H2, May 2018

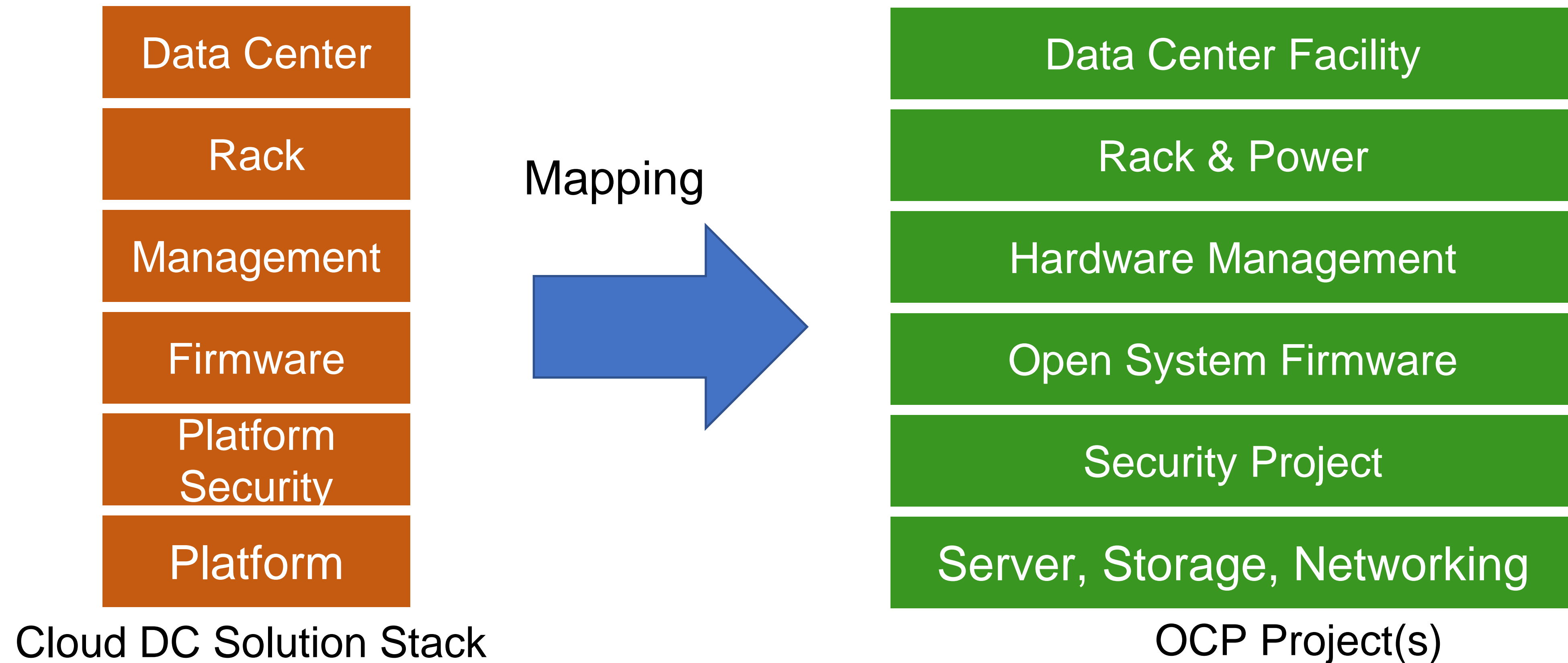


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Cloud and OCP



OCP Project(s) well-positioned to satisfy Cloud Solution Requirements

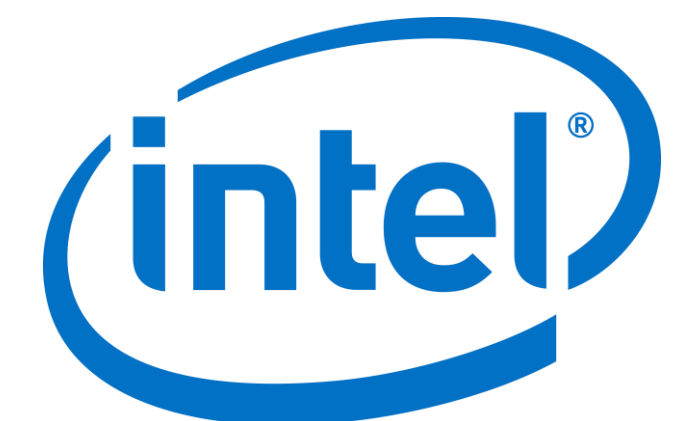
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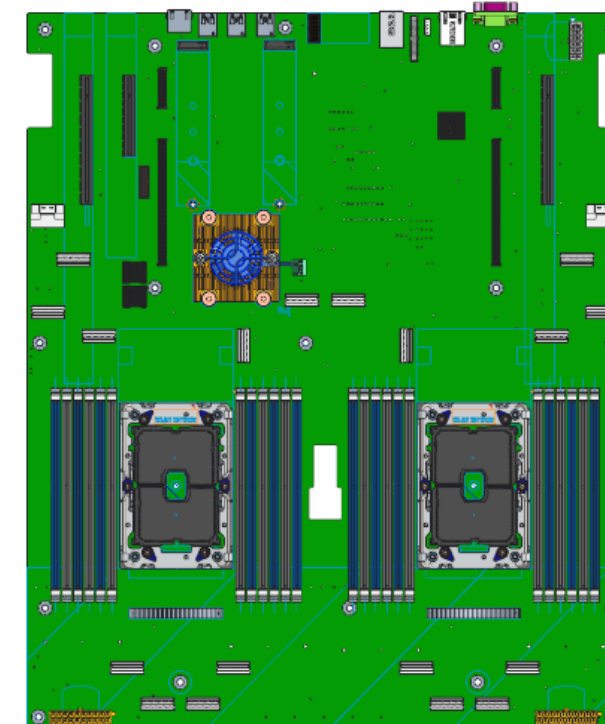


Intel® Platforms and Solution Innovations



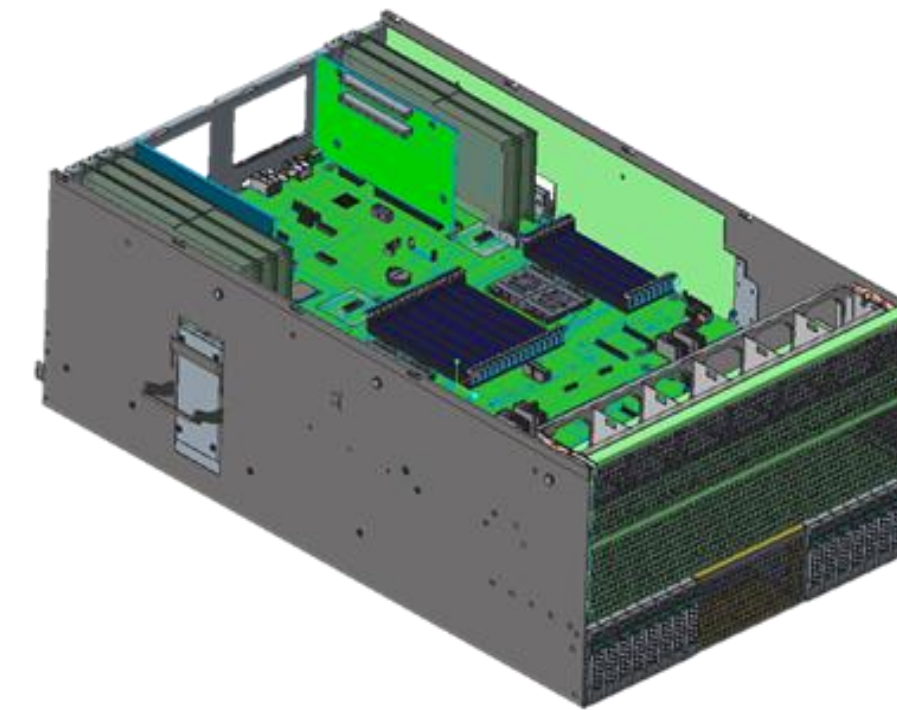
New OCP Compute Platforms This Year

Mount Olympus Next Gen Platform
for Cascade Lake Processor

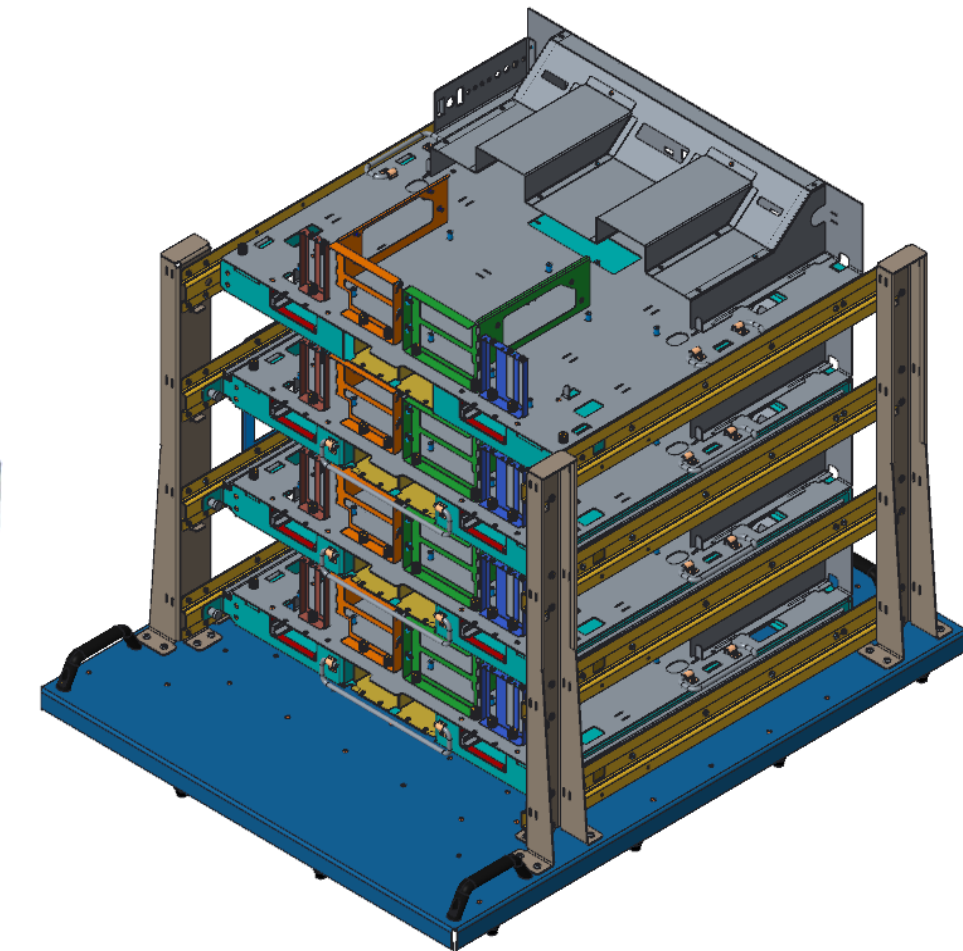


2S

Cooper Lake Processor Platforms



4S (2x 2S)



8S (4x 2S)



*Other names and brands may be claimed as property of others.

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Intel® High-Density, Cloud-Optimized Platform

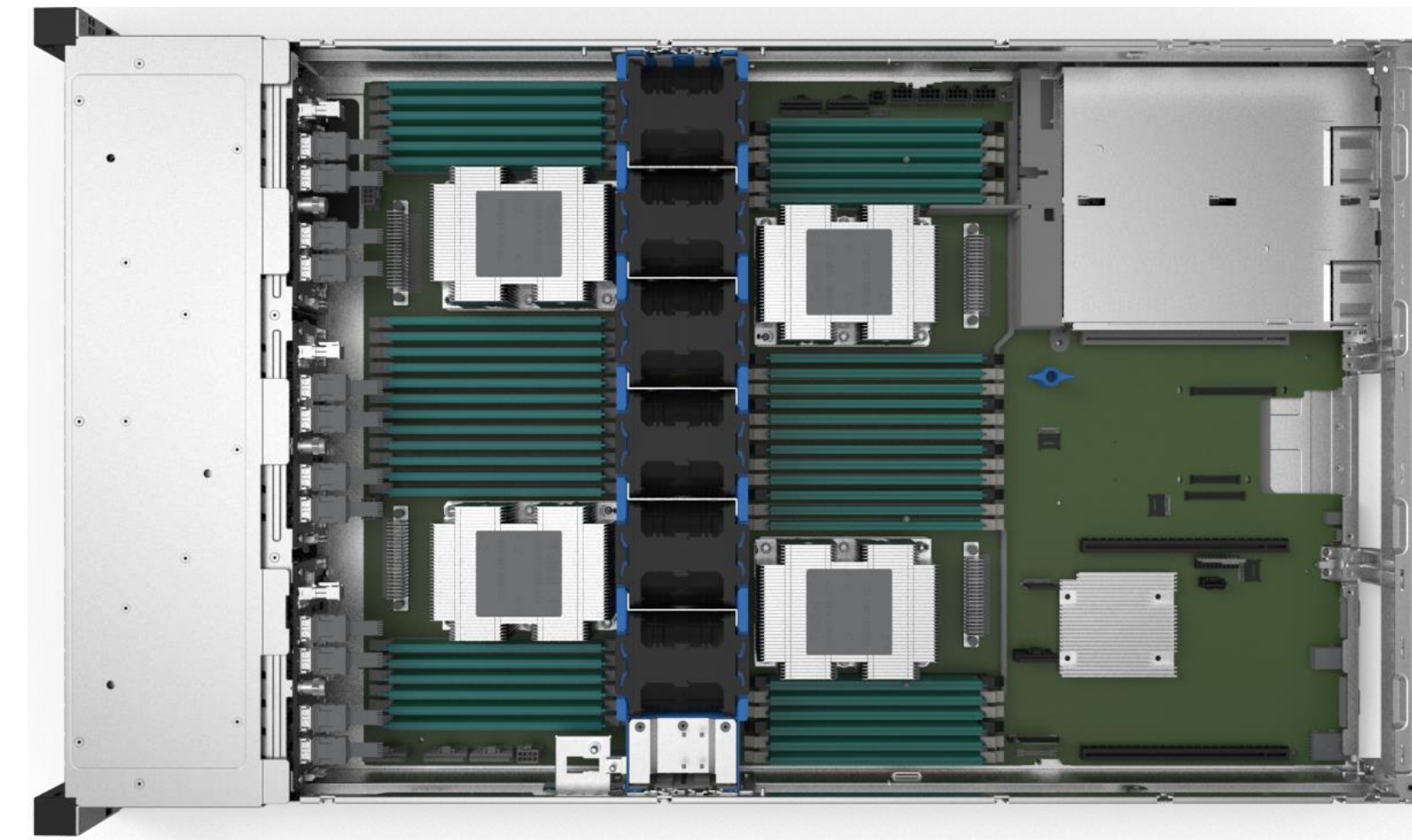
First Cloud-Optimized Platform

2U 450mm x 780mm 4S Intel® Xeon®
6xxx VM optimized processors

48 DDR4 memory slots,
SATA/SAS/NVMe 2.5”
SSD drive bays



Available in second half 2019



inspur



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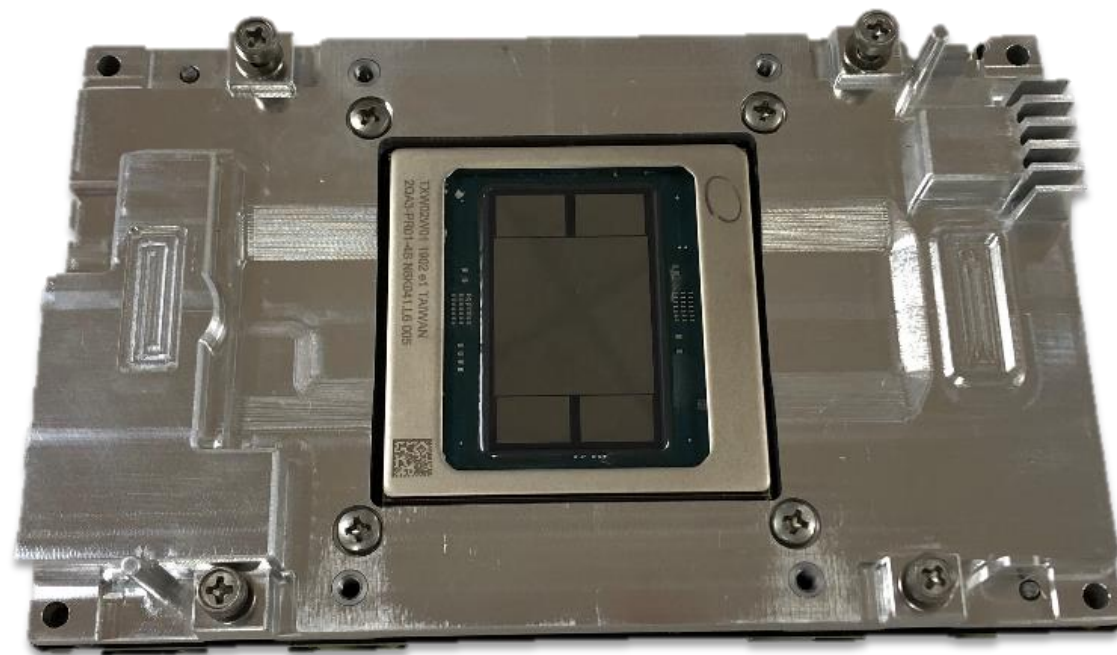
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OCP Cards Support for AI Accelerators

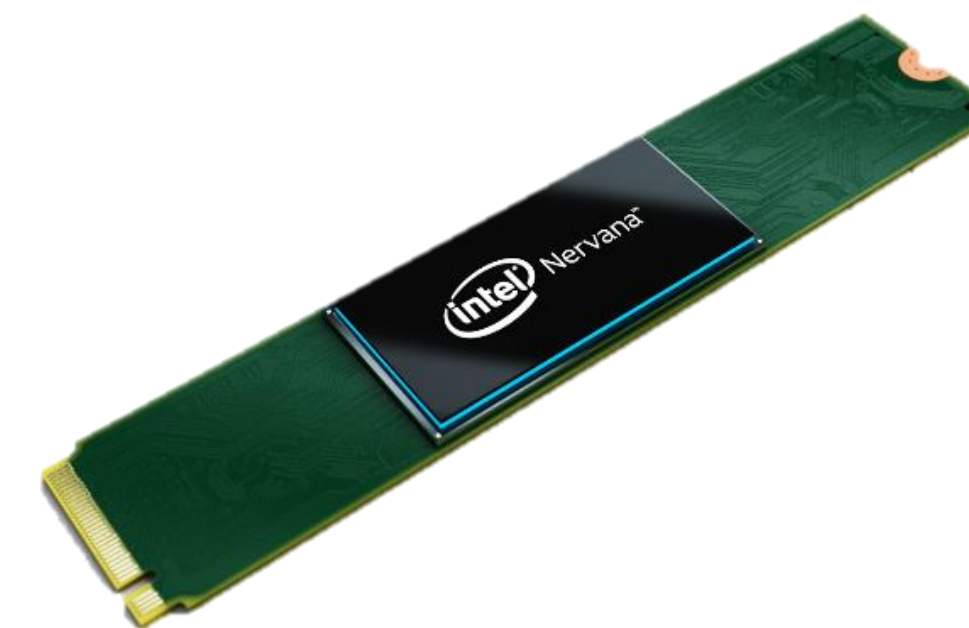
Intel® NERVANA™ Neural Network Processor (NNP)

FOR TRAINING:



Dedicated deep learning training acceleration
Optimized memory and interconnects
In production in 2019

FOR INFERENCE:



Dedicated deep learning inference acceleration
10nm Intel® process node
In production in 2019

Intel is a proud partner of the **GLOW** community

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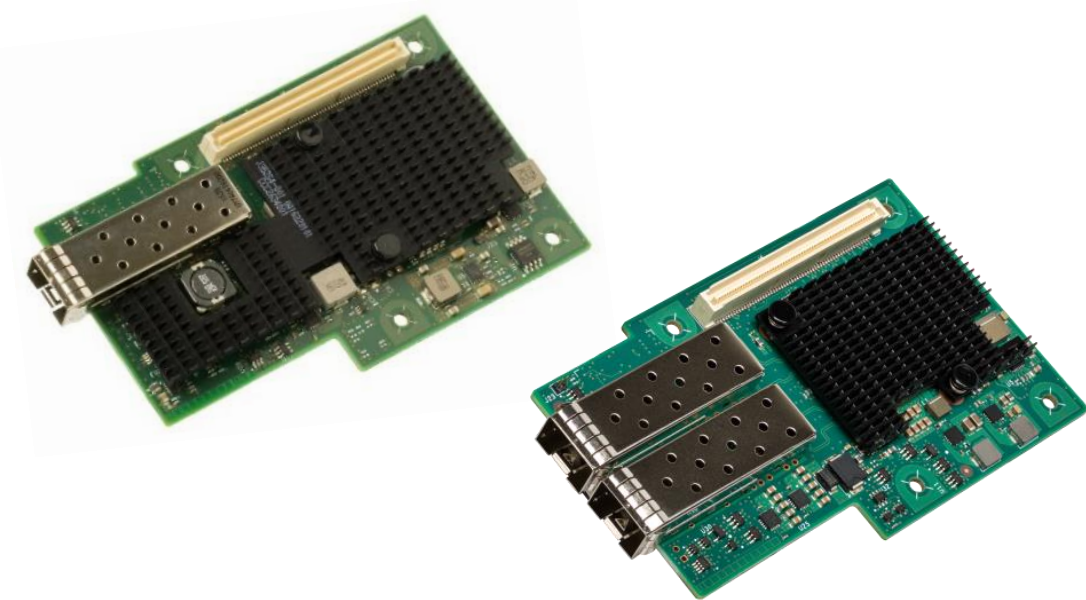
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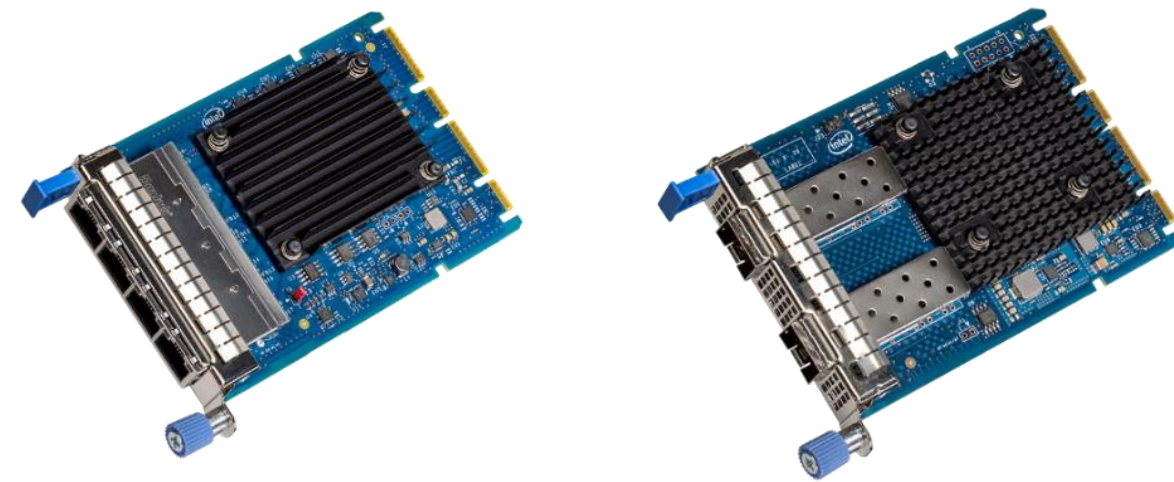
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Advancing Network Performance with OCP NIC 3.0 Adapters



25GbE Intel® Ethernet
Network Adapters for
OCP 2.0



1GbE and 10GbE Intel®
Ethernet Network
Adapters for OCP NIC
3.0



Up to 100 GbE next gen
Intel® Ethernet Network
Adapter for OCP NIC 3.0

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Now: OCP Mezzanine cards 2.0

**Intel® Ethernet Network
Adapters for OCP - 10GbE,
25GbE and 40GbE are available**

Q3'19: OCP NIC 3.0 Adapters

**Complete OCP NIC 3.0 product family from 1GbE to
100GbE (1,10, 25, 50, 100)
Flexible port configurations**

Work with us on implementing and validating your solutions

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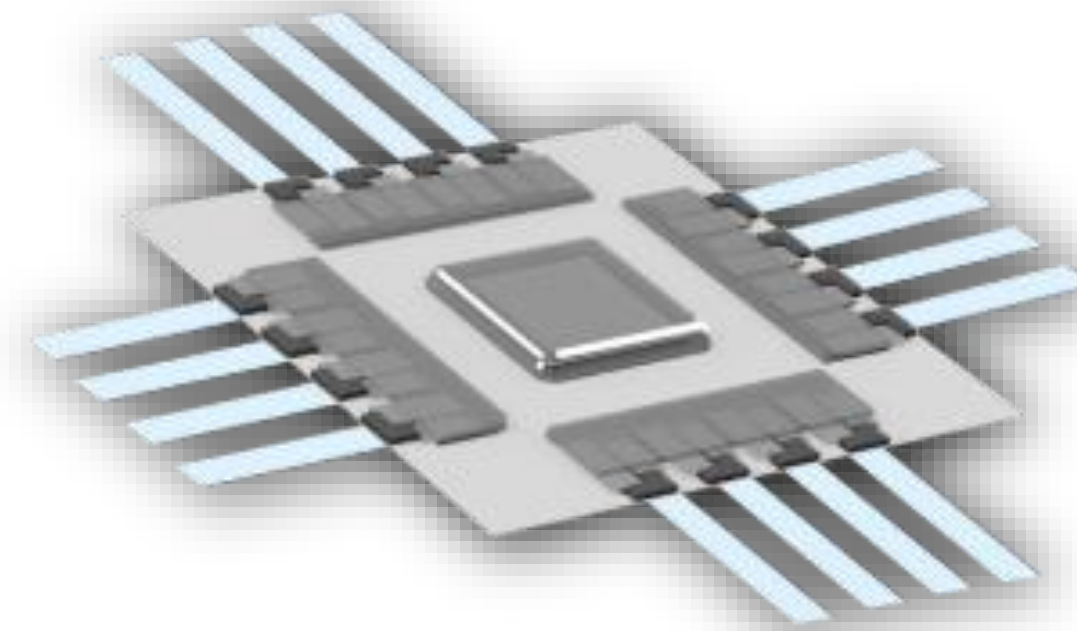


Advancing Common SI/PH Connectivity Standards

Open standard optical hardware leveraging wafer scale manufacturing
100G CWDM4-OCP shipping in volume since 2017, 400G shipping in 2019
Working to standardize electrical interfaces (die-to-die and die-to-optical) for optical I/O
and integrated networking/switch solutions



100G CWDM4-OCP



**25T+ Integrated, Co-packaged
Optical Switch IC Package**



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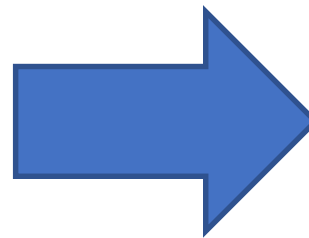


CLOUD - Managing at Scale Realities...

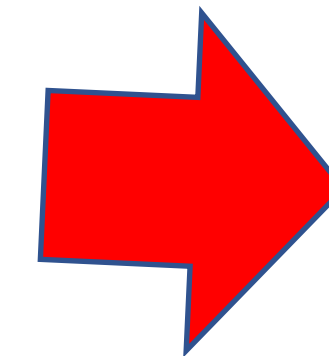
SW and FW
Updates



Errors
SW & HW



Service
Outages



@Scale Magnification



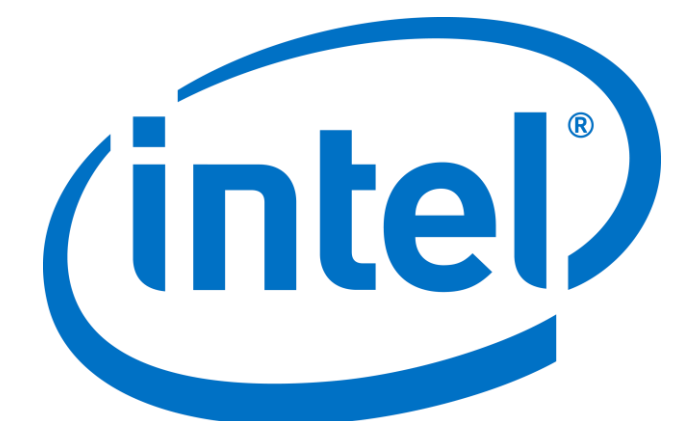
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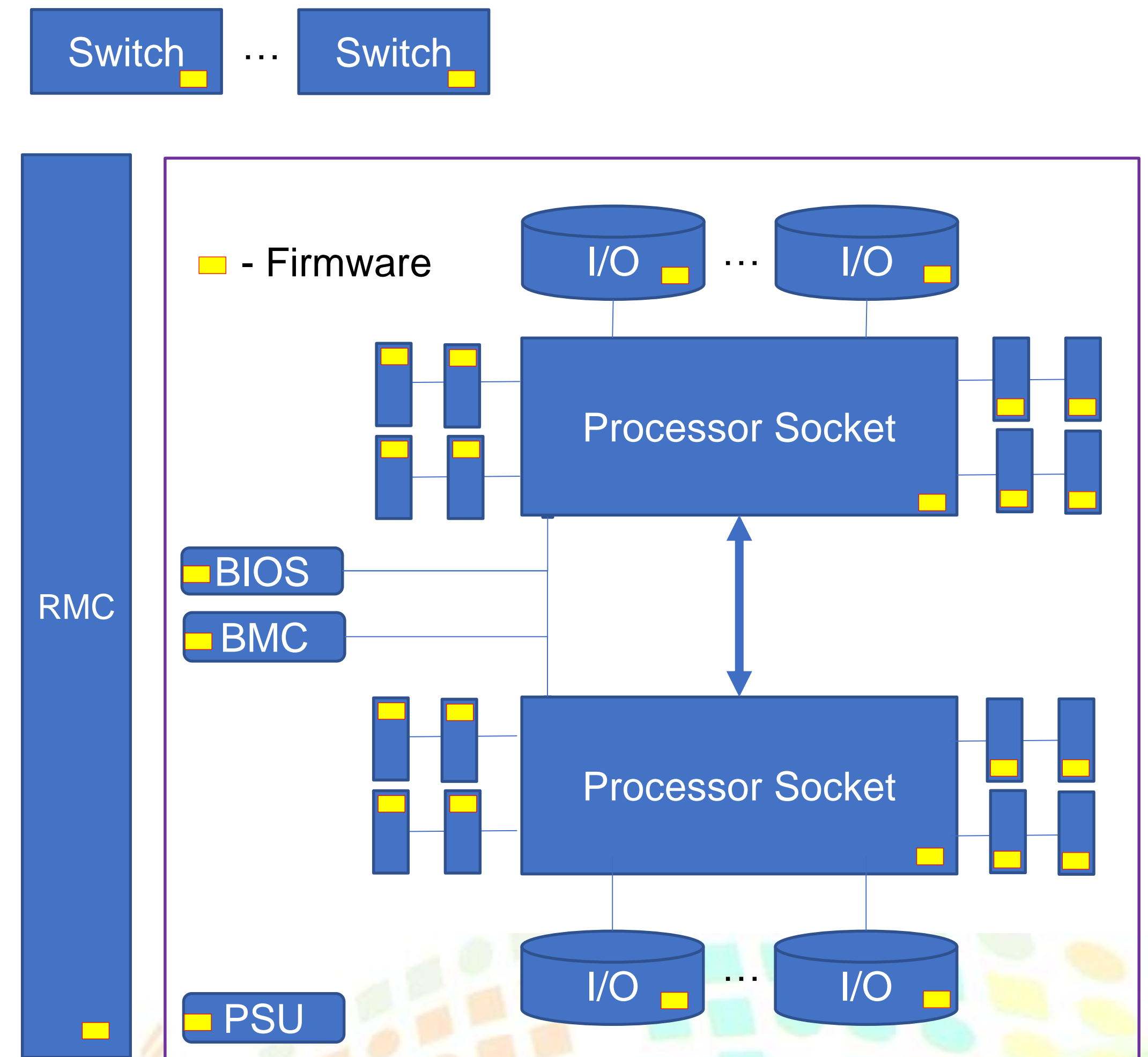


System Firmware Improvements



Cloud Firmware Update Challenges

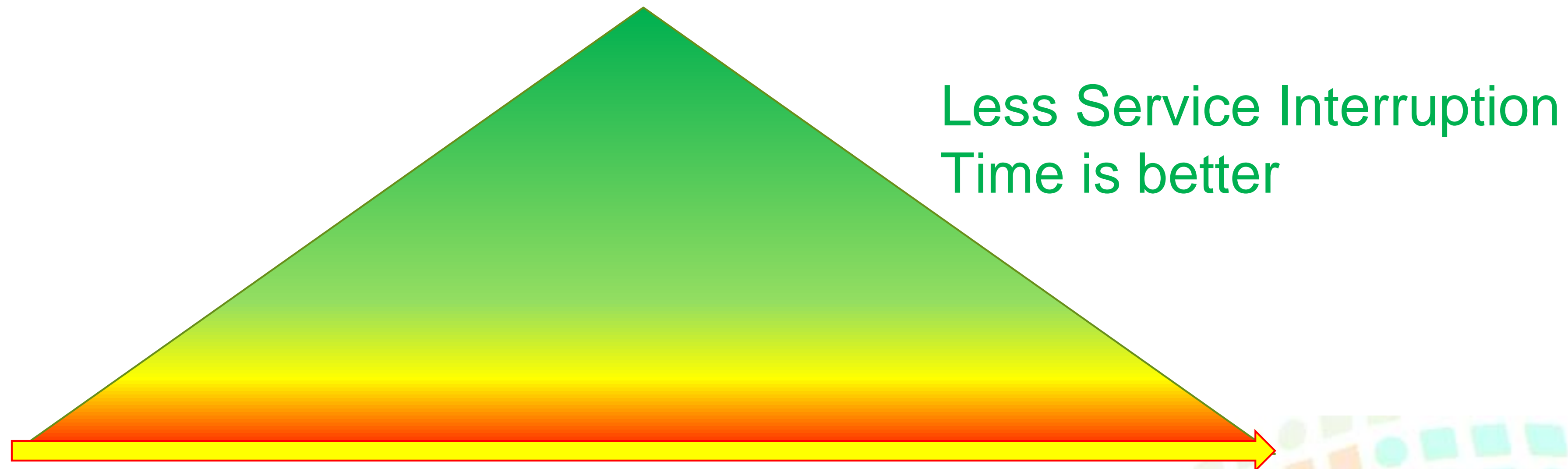
- ▶ Today's OCP system contains many hardware components with firmware
 - ▶ System Firmware - BIOS, BMC, etc.
 - ▶ Device Firmware - Microcode, Network, Storage, PSU, etc.
- ▶ Over life time of the system, the firmware components are upgraded to address:
 - ▶ Security, power, performance, bug fixes, debug/telemetry, etc.
- ▶ In most cases, system is rebooted to activate new firmware



Cloud Demands High Service Availability



System reboot affects the service availability



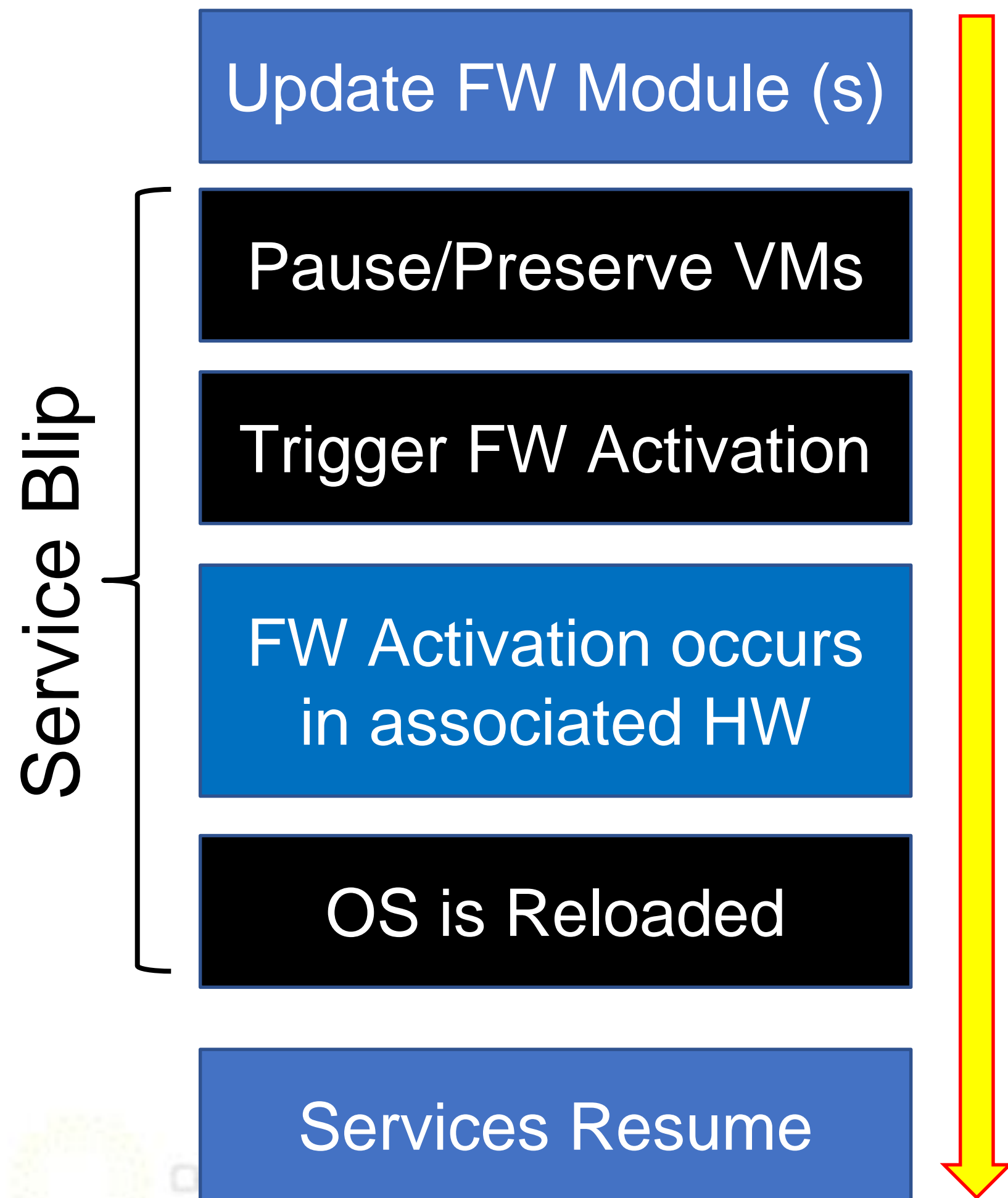
Service Interruption Time

Intel® working with partners in OCP on improving FW Upgrades

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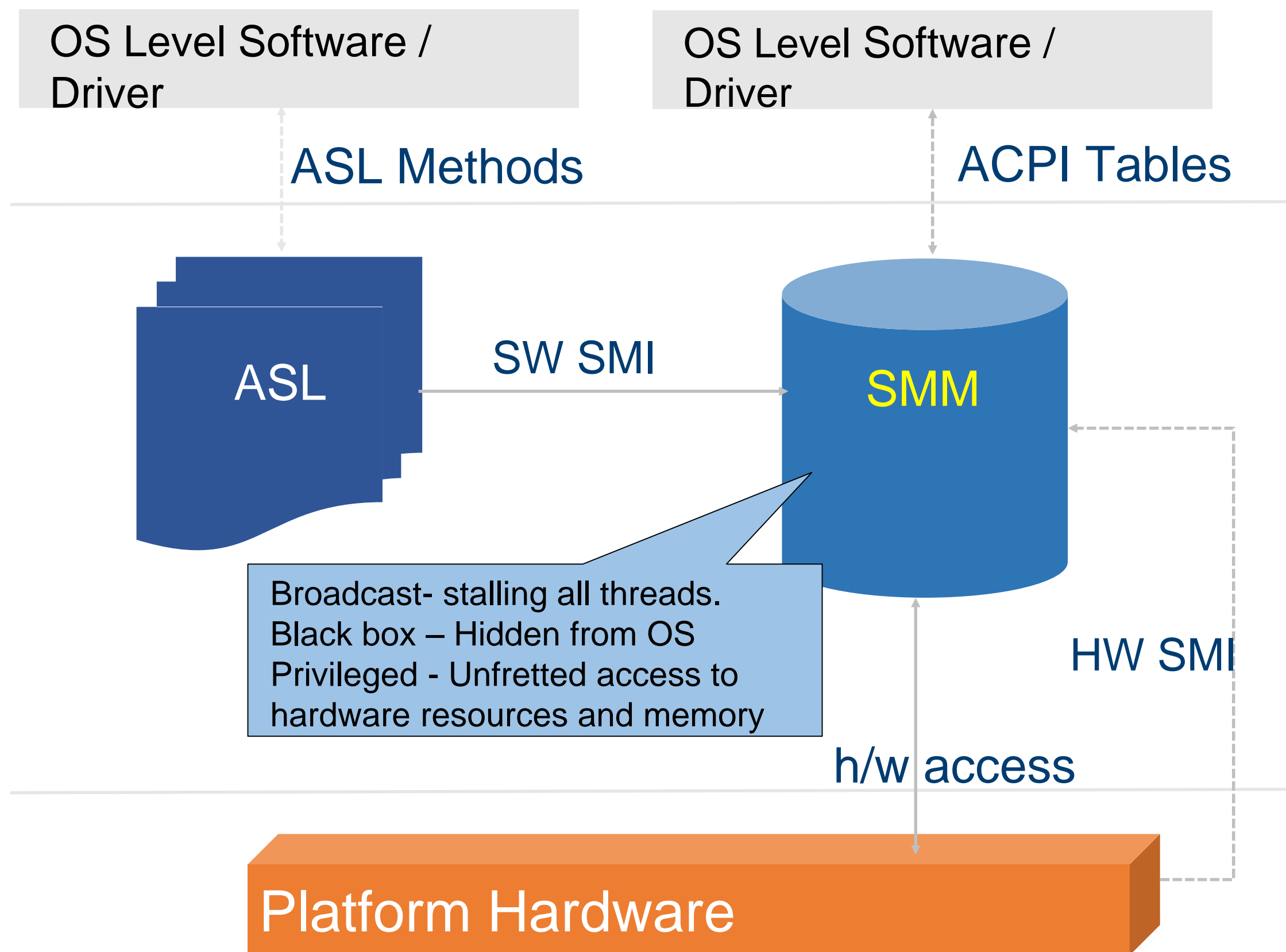
Runtime Firmware Activation Flow



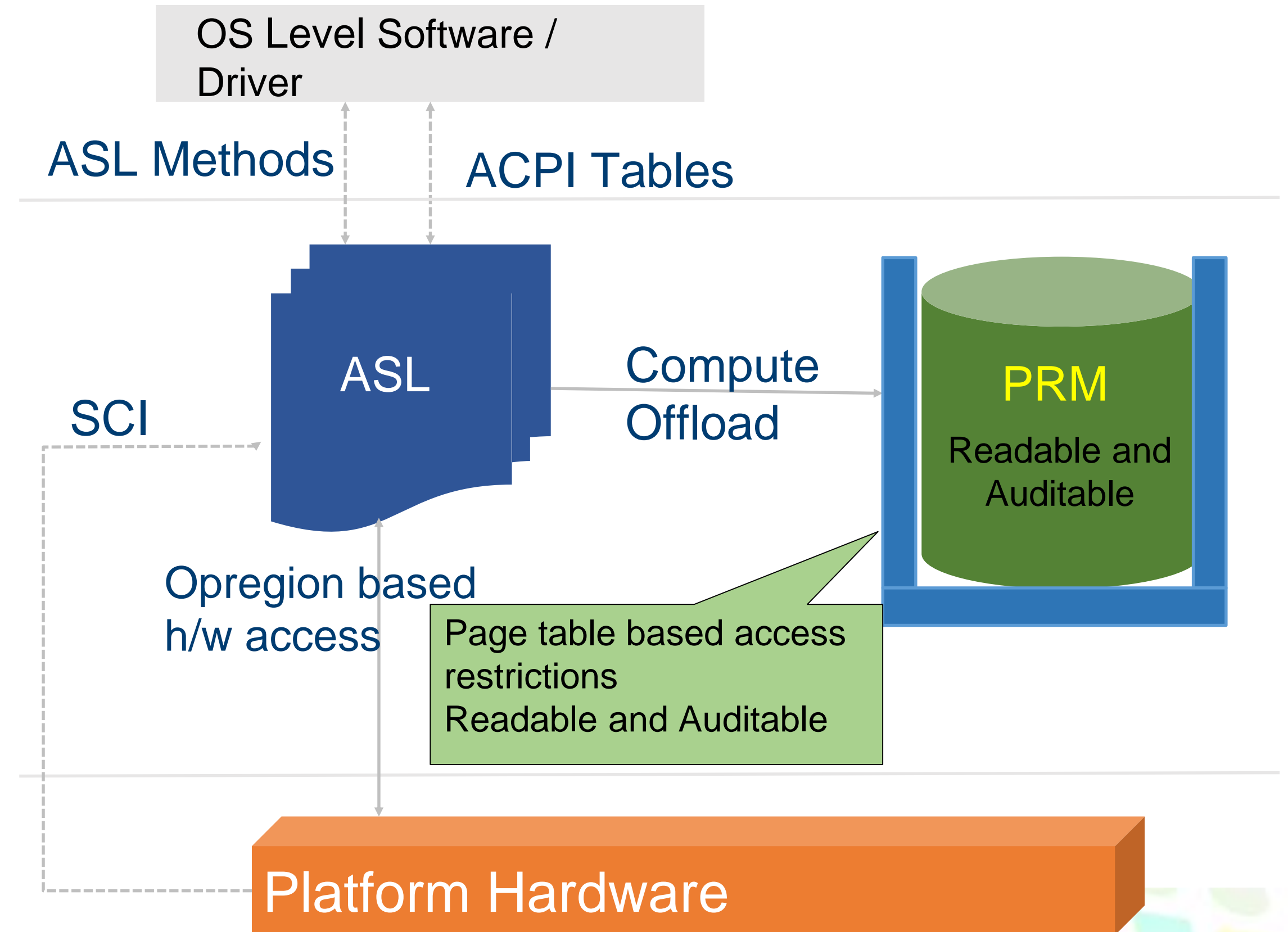
- ▶ **OS Constructs for Runtime Updates**
 - ▶ Unix/Linux - kexec
 - ▶ Windows - Memory Preserving Maintenance
- ▶ **Firmware Activation Mechanics**
 - ▶ Pause/Preserve VMs
 - ▶ Invoke Modified Reset flow
 - ▶ Activate new FW Modules
 - ▶ Load OS (memory contents still valid)
 - ▶ Resume services

Platform Runtime Mechanism (PRM)

Using SMM



Using PRM



PRM aims to reduce runtime SMMs



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Advancing Cloud Innovations via OCP Projects...

- ▶ **Intel® High-Density, Cloud-Optimized Platform – Joint OCP contribution from Intel and Inspur**
- ▶ **Data Center Cooling based on Predicting Power - Plan to contribute Whitepaper and Redfish profile to OCP DCF Project**
- ▶ **Open System Firmware (OSF)**
 - ▶ Platform Runtime Mechanism (PRM)
 - ▶ Multi-socket Firmware Support Package (FSP) & Coreboot
- ▶ **Storage Disaggregation using NVMe over Fabrics (TCP/IP or RDMA)**



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Edge Computing

▶ Edge Requirements:

- ▶ Remote management
- ▶ Ease of maintenance
- ▶ Fail in place
- ▶ Failure Resilience

▶ Intel Innovations that benefit Edge:

- ▶ Remote management
- ▶ Open Firmware and firmware complexity reduction
- ▶ Firmware resilience
- ▶ Rack & Power management



Call to Action

- ▶ Take advantage of Intel platform and solution contributions to OCP
- ▶ Participate and contribute to OCP Projects to enhance server & DC solutions



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Thank You

